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Arizona Public Service Company's Comments on the Cost Evaluation Working Group Report

Docket No. RE-00000C-00-0377

September 24, 2003

I. APS Comments on CEWG Options

When adopted, the Environmental Portfolio Standard ("EPS") and the Arizona Corporation Commission ("Commission") decision that approved the EPS contemplated a review of the costs and benefits associated with the program in 2003. Accordingly, the Cost Evaluation Working Group ("CEWG") was formed to prepare its Report, which Report was submitted on June 30, 2003.

In addition to discussing cost and benefits associated with the EPS, the Report presented two basic options for the Commission's consideration:

- Take no action at this time and leave the annual renewable energy target at 0.8 percent of retail energy sales until a future review determines that either Portfolio Standard funding is sufficient, or solar generation costs have declined to the point for Portfolio Standard program success for all utilities at the 0.8 percent level, then increase the program percentage to 1.1 percent.

- Continue the renewable energy requirement increase to 1.1 percent by 2007.

(Report at 3.)

APS continues to support the concept and goals of a properly implemented and fully-funded EPS. The present EPS has helped APS and other Arizona utilities expand previously existing renewables programs, expedited the installation of renewable capacity and has expanded the technologies of renewables being supported by customer funding.

The CEWG's Report reached significant consensus on several major policy issues, although APS, like other participants, disagreed with some specific statements and conclusions of the Report. Consensus was reached that the EPS should be continued and that the EPS was providing benefits to Arizona. Also, the CEWG generally agreed that there was value in allowing and encouraging investments in renewable technologies that offer significant future potential but which have higher current costs. This conclusion recognizes that the EPS is a forward-looking program where the best long-term investment for the future is not always the cheapest investment today.

There was also consensus that the current funding for the EPS was not sufficient to allow utilities to meet the standard under the current timeframes using the current solar-intense technology mix mandated by the EPS. Specifically, the Report concludes that "there are not sufficient funds, based on current costs of solar generation, to meet the [EPS goals]." (Report at p. 47.) But at the same time, the Commission has been understandingly wary of incurring additional costs today that would be necessarily recovered from customers in the future. Thus, in Decision No. 63364 (February 8, 2001), the Commission stated "[i]t is the intent of this Rule that the surcharge will cover the cost of the mandate." Moreover, the EPS rule itself states: "In no event, however, shall the Commission increase the surcharge caps as delineated in R14-2-

1618(A)(2)." *See* A.A.C. R14-2-1618(B)(2). It is in this context of the "irresistible force" of higher costs versus the "immovable object" of limited funding that the Commission must consider the options presented by the Report.

Regarding the two options presented by the Report, APS can support either Option 1 or Option 2, although in the case of the latter, it would suggest that 2007 is no longer a realistic target for achieving 1.1% and would endorse an extension to 2012 along with the increased funding discussed below. APS believes that Option 1 was important to include in the Report because current funding levels were never adequate to allow any Affected Utility to meet the 1.1 percent requirement by 2007, as a literal reading of Rule 1618 would seemingly require. However, APS would support Option 2 provided that the Commission takes action on the EPS that would allow Affected Utilities a meaningful opportunity to comply with the EPS requirements. In that regard, there are several possible actions that the Commission could take to allow such compliance, including:

- Extend the dates for compliance keeping other existing EPS requirements;
- Increase funding levels for the EPS;
- Alter the technology mix between solar and other renewable resources; or
- A combination of these actions.

II. APS' Experience With the EPS

APS is committed to developing clean renewable energy sources that will fuel tomorrow's economy. APS intends to accomplish this in part through continued development of the technologies showing the most promise. The EPS provides an opportunity for Affected Utilities to participate in the purchase, construction, and development of renewable-resource energy systems such as solar, biomass, geothermal and wind to pursue that objective.

The EPS program provides for multi-year, pay-as-you-go development of renewable energy resources in Arizona. The EPS has also enabled utilities to pursue a wide diversity of projects, adapt to market and technology conditions as they change, and to take responsibility for project performance. This has yielded measurable cost decreases at the utilities implementing the EPS, as opposed to what are primarily "price supports" created by buy-down programs in other states. Additionally, the EPS has allowed Arizona utilities to provide higher value and lower cost solar installations than similar programs in other states.

Under the EPS, in a short period of time APS has significantly increased its pace of solar installations to well over one megawatt per year and is currently developing one of the largest solar power plants in the world. Unit costs of solar have been reduced to under $\$6000/kW_{ac}$. Also, per capita solar energy produced exceeds that in other states and innovation and use of new solar technologies with lower cost potential has expanded during this period. Solar dish engine work is continuing, and APS is finalizing the installation of a one MW solar trough, which would be the first commercial solar trough project used for electricity production since 1989.

While solar technologies are the current emphasis of the EPS, several megawatt-scale biomass and geothermal generation projects are now under development by APS. These non-solar renewable projects can play a valuable role in adding lower cost renewable energy into the EPS mix and increase progress toward the EPS goal. They also allow APS to utilize other available resources yielding many of the same benefits sought by the EPS program while solar installations, technology development, and cost reductions continue for greater long-term deployment of solar resources.

III. Specific APS Initiatives

A. Grid-Tied Solar Installations

From 1997 through 2002, APS completed numerous solar photovoltaic ("PV") projects on the order of 100 kW around the state in locations visible in the community. These sites included APS' Solar Test And Research or STAR facility at the Ocotillo Power Plant in Tempe, the APS Service Center in Flagstaff, the Glendale Airport, the Gilbert Nature Center, Embry Riddle Aeronautical University in Prescott, the APS Yucca Power plant in Yuma, and the Water Campus in Scottsdale.

Additionally, 22 rooftop systems were installed on customer premises ranging from 2 kW under Project Sol which was focused at customers in the educational field, to larger systems under special commercial relationships with Scottsdale, ST Micro, and the new ADEQ building in downtown Phoenix. One location, the Prescott Airport site, will allow APS to install over 5 megawatts of solar capacity. At that location, solar plant operations will benefit from the clearer skies and cooler temperatures in Prescott compared to sites in the Phoenix valley. Nearly 2 MW have been installed in 2003 and the entire build-out to 5 MW is expected to be completed in the next three to five years.

In addition to large utility installations, APS also offers rebates to customers that install their own solar technologies, including both photovoltaic and solar water heating systems. As of the end of 2002, 121 homeowners and institutions have taken advantage of this program, totaling 235 kW of PV installations. In addition, more than 60 installations were supported for Native American homeowners on the Hopi Reservation totaling 17.3 kW.

B. Solar Cost Reductions and Projections

APS installed costs for solar PV systems have declined from \$8,800/kW_{ac} to \$5,900/kW_{ac} (\$5,000/kW_{dc}), a decrease of over 33 percent over a five-year period. These cost reductions have been achieved at the same time as kWh output performance of the PV modules has been increased by 10-20 percent through the use of single-axis tracking systems that APS has helped develop, further reducing the cost of solar energy produced from these systems.

Cost reductions in PV have generally come from a combination of increased project sizes, decreases in PV module market prices, and improvements in "balance of system" design which includes the electrical, structural, and installation costs. Largely as a result of the EPS,

most of the "balance of system" cost reduction opportunities now have been achieved. Thus, the most significant remaining area for cost improvements lie in the PV modules.

APS has installed and operates the largest Concentrating PV ("CPV") system in the world, which will total over 500 kW_{ac} by end of 2003. Although still in development and produced at a very small volume, CPV has already achieved costs comparable to conventional PV. New multi-junction PV cells from the spacecraft industry have efficiencies of 30-40 percent, and are now being designed into utility CPV systems. At volumes of 5-10 MW/year, installed costs of CPV are projected to be in the \$3000-\$4000/kW_{ac} range, again reducing the cost of energy produced.

C. Public Involvement and Economic Development

In 1997, APS provided the first solar energy purchase program to customers in the state with the APS Solar Partners Program. This program—important more for its involvement of customers than for revenue produced—continues to grow. Other utilities in Arizona soon followed and created their own "green pricing" programs.

Also, APS placed all of its early projects in a variety of visible community locations to help foster public awareness of solar energy options. These locations range from Flagstaff to the Mexican border, and from rooftops to 100 kW fields, and include both tracking-PV systems and fixed-PV rooftops. This undertaking required more effort by APS but it has been critical in enhancing public awareness and understanding of solar, and allowed APS to involve the communities, address siting issues, and facilitate the process of innovation.

APS also has supported Arizona companies involved in solar and renewable energy. First, APS uses in-state engineering and manufacturing whenever practical, in combination with experts from around the world. This has yielded new designs and manufacturing in solar structures, trackers and controls, with new inverter designs now in development in Flagstaff and Phoenix. In fact, APS has helped attract an internationally established inverter systems company to open an office and hire technical staff in Arizona. This company is filling inverter needs not met by other suppliers, and has created a domestic company to serve both United States and international markets.

D. Other Renewable Technologies

APS is also developing other renewable technologies, such as biomass, biogas, geothermal and wind. While such resources may not be as abundant as the sun in Arizona, these technologies are often more mature and less technically challenging. As such, they generally have costs lower than solar while still providing the benefits sought be the EPS program, such as taking advantage of renewable resources that exist in the state and/or that provide opportunities for economic development within Arizona.

For example, in Eagar APS is helping develop a 3 MW biomass power plant. This facility will use biomass materials from forest thinning and other forest health projects, as well as waste wood from the recent forest fires in northeastern Arizona. Other biomass opportunities are being

explored throughout the state and will offer the dual benefits of providing a reasonable cost renewable energy and improving the health of our forests. APS is also exploring geothermal opportunities in Southeastern and Northern Arizona, wind opportunities in Northwest Arizona and landfill gas opportunities state-wide.

These other, non-solar renewable technologies offer an opportunity to increase the amount of renewable generation available for APS customers at a lower cost than solar technologies can currently offer, while still meeting the underlying policy goals of the EPS. Thus, APS views such other technologies as significant components of the EPS, and as one potential option should the Commission wish to move closer to the EPS goals while maintaining lower funding levels.